REMARKS

Reconsideration and reexamination of the application are requested. Claims 1 and 2 are amended. Claims 1-9 remain pending.

Claim objection

Claim 2 is objected to because the status identifier was incorrect. Claim 2 is presented herein again with the same amendments as submitted on February 17, 2006, but including the correct status identifier. Applicants apologize for any confusion caused.

Claim rejections

Claims 1, 4 and 5 are rejected under 35 USC 103(a) as obvious over Imaseki et al (US 5,453,930).

In addition, claim 6 is rejected under 35 USC 103(a) as being obvious over Imaseki et al. in view of Masaki et al. (US 5,345,155).

In addition, claims 2, 3, 7 and 8 are rejected under 35 USC 103(a) as being obvious over Masaki et al. (US 5,481,460).

In addition, claim 9 is rejected under 35 USC 103(a) as being obvious over Masaki et al. (US 5,481,460) in view of Masaki et al. (US 5,345,155).

With respect to claim 1, Imaseki does not teach or suggest a steering apparatus of a motor vehicle having a pair of steerable wheels that are manually steerable by a driver, that comprises first and second motors each generating a steering assisting force to be applied to a manual steering system of the motor vehicle that is connected to the steerable wheels to assist the driver's manual steering effort in steering the steerable wheels.

Imaseki discloses a drive system for an electric automobile that uses electric motors 4A, 4B, 5A, 5B to directly drive wheels 2A, 3A of the automobile (column 2, lines 10-12, 21-24; Figures 5 and 8). Imaseki separately provides a manual steering system 30 for steering the wheels (column 12, lines 35-36; Figure 5). The electric motors 4A, 4B, 5A, 5B in Imaseki are not part of the manual steering system 30.

Column 12, lines 21-26 of Imaseki does disclose that the electric motors 4A, 5A provide a steering action. However, there is no disclosure that the steering action of the

motors 4A, 5A generates a steering assisting force to be applied to the manual steering system 30. Further, any steering that results from the motors 4A, 5A is not an assist force, as there is no disclosure that the steering of the manual steering system 30 is assisted in any way.

In addition, Imaseki does not disclose a first control frequency that has a value that is greater than a second control frequency. In the rejection, this feature is asserted to be obvious "since it is well known in the art that having a speed difference comprises one [sic] speed to be greater than the other". This conclusion is simply not supported by Imaseki. As noted by the Examiner, Imaseki discloses that the two motors can be driven at different speeds to result in different speeds of the wheels. However, there are other ways to achieve differing speeds without using differing frequencies. For example, the two motors could have differing torque characteristics where differing speeds are achieved using the same control frequency. This concept is actually disclosed in Imaseki, where a rear-wheel drive motor is described as having a torque characteristic different from the front-wheel drive motor (column 7, lines 60-62; Figures 2 and 3). Although Imaseki does not disclose the two motors 4A, 5A in Figure 5 as having differing torque characteristics, Imaseki also does not disclose them as having the same torque characteristics. Further, Imaseki discloses that differing speeds can result on two motors, even though driven at the same frequency, due to a difference in torque characteristics. Therefore, a person of ordinary skill in the art would actually be taught to rely upon differing torque characteristics, as taught by Imaseki, rather than using differing driving frequencies.

As described in Applicant's specification, conventional electric power steering apparatus typically have a single electric motor that provides a steering assist torque to be applied to an element, such as a rack shaft, of a manual steering system extending from a steering wheel to steerable road wheels, so as to reduce the driver's manual steering effort. See page 1. Due to an increase in the weight of vehicles to which an electric power steering apparatus is incorporated, the electric power steering apparatus is required to produce a larger steering assist torque. To meet this requirement, Applicant's electric power steering apparatus is provided with two electric motors. Although two electric

motors are provided, the two motors are still used to drive a "single" object, such as a rack shaft 14 (Figures 1 and 2), of a manual steering system extending from the steering wheel 11 to the steerable road wheels.

In contrast, Imaseki (and Masaki '155 and Masaki '460) describe two electric motors which are used for independently driving wheels of a motor vehicle. In other words, the electric motors are used to drive two different objects independently from one another. Even if Imaseki (or Masaki '155 and Masaki '460) actually teach that the motors are driven with different frequencies, which Applicants do not concede, the rejection is improper because claim 1 recites that the two motors generate a force to be applied to a manual steering system (i.e. a singular steering system or object), while the motors of Imaseki (and Masaki '155 and Masaki '460) each control different objects.

For at least these reasons, claim 1 is patentable over Imaseki. Claims 4-6 depend from claim 1 and are patentable therewith and need not be separately distinguished. Applicants do not concede the rejection to claims 4-6.

In particular, with respect to claim 5, elements 47 and 48 in Imaseki are said to be part of the first and second drive circuits in rejecting claim 1, while also being the first and second controllers in rejecting claim 5. Elements 47, 48 cannot be both part of the drive circuit for claim 1 and at the same time be the first and second controller for claim 5, since the drive circuits and control system/first and second controllers are claimed as separate features.

With respect to claim 6, elements 13a, 13b in Masaki '155 identified in the rejection are not steering torque detectors that input steering torque signals to a control system. Elements 13a, 13b of Masaki '155 detect torque on wheel shafts. They do not detect steering torque or input steering torque signals to a control system.

With respect to claim 2, Masaki '460 does not teach or suggest a steering apparatus of a motor vehicle having a pair of steerable wheels that are manually steerable by a driver, that comprises first and second motors each generating a steering assisting force to be applied to a manual steering system of the motor vehicle that is connected to the steerable wheels to assist the driver's manual steering effort in steering the steerable wheels.

Masaki '460 is generally similar to Imaseki, in that Masaki '460 discloses a drive system for an electric automobile that uses electric motors 3a, 3b to directly drive wheels 2a, 2b of the automobile (column 3, lines 58-62; Figure 1). Masaki '460 separately provides a manual steering system 10 for steering the wheels (column 4, line 31). The electric motors 3a, 3b in Masaki '460 are not part of the manual steering system 30. There is no disclosure in Masaki '460 that the steering action of the motors 3a, 3b generates a steering assisting force to be applied to the manual steering system 10. In addition, the motors 3a, 3b each control different objects, instead of generating a steering assist force to be applied to a single object (i.e. a manual steering system) as discussed above for claim 1.

In addition, Masaki '460 does not disclose a control system connected to the first and second drive circuits and producing a first pulse signal at a first phase for switching on and off said switching element of the first drive circuit and producing a second pulse signal at a second phase for switching on and off said switching element of the second drive circuit, wherein the first phase is offset from the second phase.

The rejection refers to column 13, lines 35-61 in Masaki '460 as teaching a first phase offset from a second phase. Although Masaki '460 discusses that a phase difference can result, Masaki '460 teaches to reduce or eliminate any such phase difference as part of the control process so that the phases coincide (column 13, lines 36-43; column 14, lines 13-21). There is no disclosure that the switching elements of the drive circuits are actually driven by first and second phases that are offset, since Masaki '460 provides means to eliminate phase differences in the disclosed control system.

In contrast, claim 2 recites that the control system produces a first pulse signal at a first phase for switching on and off said switching element of the first drive circuit and a second pulse signal at a second phase for switching on and off said switching element of the second drive circuit, wherein the first phase is offset from the second phase. The claimed control system actually produces offset phases. In Masaki '460, the control system produces in phase signals, and if the signals happen to go out of phase, the phase difference is eliminated. At no point does the control system in Masaki '460 intend to produce or accidentally produce pulse signals with offset phases that are then used to

switch on and off switching elements of drive circuits. In Masaki, if any phase difference does occur, the phase difference is eliminated before the signals are used to control anything.

For at least these reasons, claim 2 is patentable over Masaki '460. Claims 3 and 7-9 depend from claim 2 and are patentable therewith and need not be separately distinguished. Applicants do not concede the rejection to claims 3 and 7-9.

In particular, with respect to claim 9, elements 13a, 13b in Masaki '155 identified in the rejection are not steering torque detectors that input steering torque signals to a control system. Elements 13a, 13b of Masaki '155 detect torque on wheel shafts. They do not detect steering torque or input steering torque signals to a control system.

In view of the above, early issuance of a notice of allowance is solicited. Any questions regarding this communication can be directed to the undersigned attorney, Curtis B. Hamre, Reg. No. 29,165 at (612) 455-3802.

Respectfully submitted,

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